Surface Operations Office

Surface CDM Situational Awareness

Presented by: Stephen C. Ryan

Federal Aviation Administration

Topics for Discussion

- **Background of Surface Situational Awareness (SSA) Capability**
- **What is SSA and the Need**
- **SSA Facilitates**
- **Potential Capability Considerations**

Connecting the Dots

'SCDM' ConOps Validation
Completes surface management integration across domains with full Stakeholder participation →

Airport Surface Flow Management

Procedures, Roles, and Responsibilities

SCDM/TFDM link to the NAS

Enhances NAS efficiency and reduces environmental impact ←

Departure Reservoir Queue Management (DRM)

Enables shared situational awareness ('SSA') ←

Basic Surface Surveillance

Foundation- improves predictability ←

Data Exchange and Integration

Timeline ↑

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SSA Background

- **NextGen Mid-Term Implementation Task Force (TF5) Recommendations (September 2009)**

  - *Increase Surface Situational Awareness, movement and non-movement area*

  - *Flight Operators made investments in "surface management"*

- **Emerging need to manage holistically**

  - *TRACON*

  - *Center*

  - *Command Center*

- **Fundamental to the Surface CDM Concept of Operations**

  - *Transparency*

  - *More informed decision making*

  - *Insight to "real demand"*

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SSA Definition

- **Timely sharing of real-time surface conditions and forecast operational information**
  - *Airport Movement Display*
  - *Airport Configuration Information*
  - *Event Times*
  - *Taxi/Runway Demand Prediction*
  - *Gate Assignments and Times*
  - *Total Surface Delay*
  - *System Constraints, Ground and Airborne*

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SSA Facilitates

- **Better understanding and prediction of the airport operation**
  - *Strategic Planning and Tactical Management of Airport Surface Traffic Flows and Departure Queue Length*

- **Improved Management of Arrival Traffic Flows**
  - *Increase throughput with better balance of arrival and departure demand*

- **Analysis, Measurement, and Monitoring (Scorecard)**
  - *Objectively quantify airport operational performance, the impact of the specific airport operations on the NAS, and the performance of individual Stakeholder organizations*

Potential Surface Situational Awareness Capabilities

- **Predictions**
    - *On Block Time*
    - *Off Block Time*
    - *Take-Off Time*
    - *Time at the Departure Queue*
    - *Departure Queue Length*
    - *Departure Delay*
    - *Number of flights taxiing on the airport surface*

Predictability and Transparency are Pivotal to the Success

Potential Surface Situational Awareness Capabilities (Con'd)

- **Display**
    - *Aircraft location on the airport surface*
    - *Multiple airports on a single display*
    - *Gate Location and Identification*
    - *Airport Configuration*
    - *Arrival and Departure Demand Graphs*
    - *Delay Graph*
    - *User Configurable*

Predictability and Transparency are Pivotal to the Success

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Potential Surface Situational Awareness Capabilities (Con'd)

- **Post-Event Analysis**
  - *Flight History*
  - *Constraint History*
  - *Comparison of "actuals" versus predictions*
- **Constraint Identification and Notification**
- **Current and Future Gate Conflicts**
  - *Detection*
  - *Notification*
- **Alerts and Notifications**
- **Security**
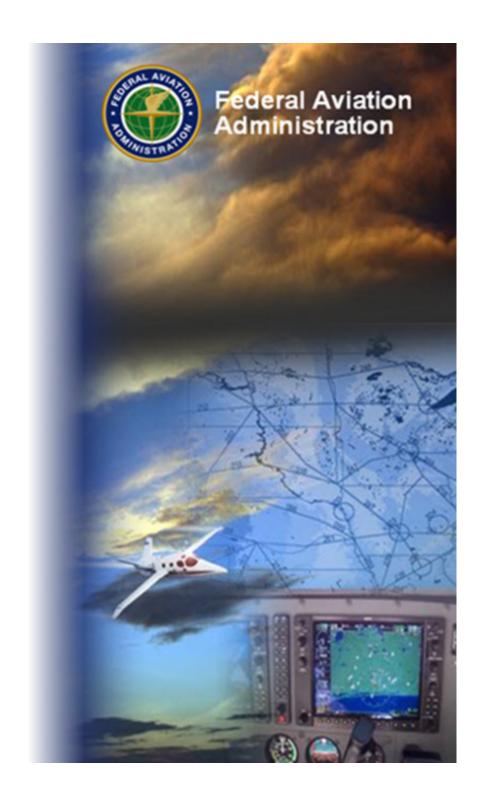
Predictability and Transparency are Pivotal to the Success

Thank You!

Terminal Flight Data Manager

Electronic Flight Data (EFD) Overview

Presented by: Kimberly Brooks

Federal Aviation Administration

Outline

- **Tower Systems and Cab Environment Challenges**

- **Paper Flight Strips Shortfalls**

- **TFDM Capabilities**

  – Electronic Flight Data

  – TFDM EFD Tower Positions

- **Integration of Traffic Flow Management**
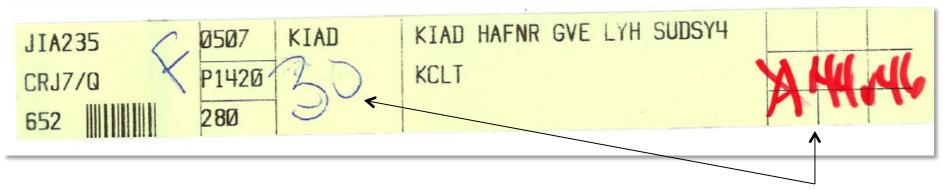
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Tower Systems and Cab Environment Challenges

- **Paper flight strips limiting external, electronic data exchange and inter/intra-facility coordination**
- **Multiple stove-piped systems, multiple homegrown tools with little national integration (EFSTS, DSP, ARMT, etc.)**
- **No more room for new functionality, including display real estate**

Existing Paper Flight Strip
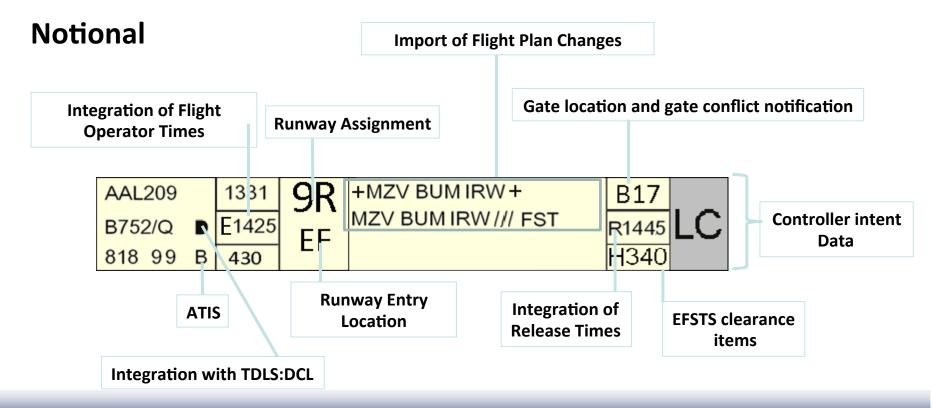

Handwritten Data

Memory Aids

Paper Flight Strips Shortfalls

- **Prone to ATC miscommunication**
  - Errors and Typos

- **Lengthy manual update process**
  - Flight Plans and Strips
  - Time completing administrative duties, preparing and entering reports

- **Workload to distribute paper flight strips is a distraction**
  - Hand carry and manual/verbal coordination required
  - Controllers are away from operating positions

- **Lack of shared inter/intra facility data exchange and coordination**

- **Decision making workload**
  - Manual and approximate calculation of Minutes in Trail (MINIT)

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TFDM Electronic Flight Data

Electronic flight strips will provide a method to convey both the strategic and tactical plan to controllers as well as improved amendment and coordination capabilities
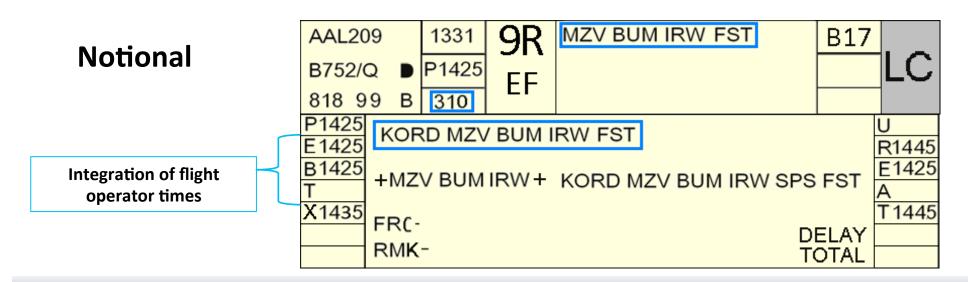
Notional

Import of Flight Plan Changes

Integration of Flight Operator Times

Runway Assignment

Gate location and gate conflict notification

AAL209	1331	9R	+MZV BUM IRW +	B17	LC
B752/Q	E1425	EF	MZV BUM IRW /// FST	R1445	
818 99 B	430			H340	

Controller intent Data

ATIS

Runway Entry Location

Integration of Release Times

EFSTS clearance items

Integration with TDLS:DCL

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TFDM Electronic Flight Data

- **Inter/intra facility data coordination**
  - Shared situational awareness
  - Electronic Flight Data Exchange with ATC and non-ATC stakeholders, e.g. Controller Intent Data

- **Integration of flight data with surveillance data providing a common picture for ATC**
  - Increased situational awareness
  - Improved Safety Logic with controller intent data

- **Minimizes ATC workload and heads down time**

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TFDM Electronic Flight Data

- Electronic flight data provides a means to make batch changes, use common databases and receive data from multiple sources, e.g. ERAM

- Electronic flight strips can be adapted to any facility or tower position based on local preference and national guidelines

Notional

Integration of flight operator times

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TFDM EFD Tower Positions

- **Electronic Flight Data provides flexibility for individual tower positions**

- **Clearance Delivery (CD), Ground Controller (GC), Local Controller (LC)**
  - Flight Data Entry and Display: Flight plans and amendments, flight status, etc.
  - Pre-Departure Clearance/Departure Clearance
  - Digital ATIS

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TFDM EFD Tower Positions (Con'd)

- **Traffic Management Coordinator (TMC)**
  - Decision Support Tools (DST) and capabilities (Airport Configuration, Runway Load Balancing, Surface Scheduling)
  - Predictive Runway Timelines provide: flight IDs, route information, constraint data, meter/non-meter times, runway assignment, estimated departure times and predicted delay times
  - Integrated Time Based Flow Management tools for an automated/automatic release capability
  - Interface to Traffic Flow Management System for constraint and route data
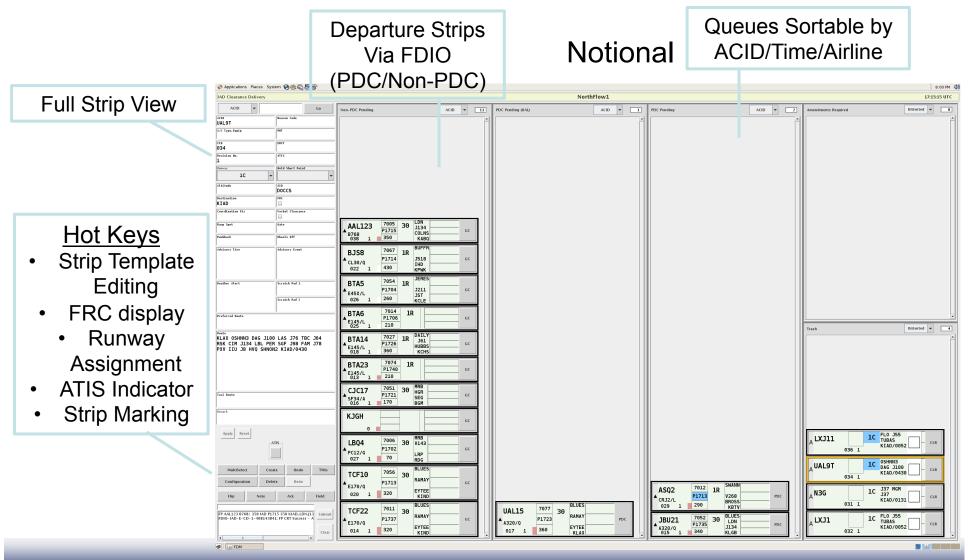
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TFDM EFD Tower Positions (Con'd)

- **Front Line Manager (FLM)/Tower Supervisor**
  - Airport Management Configuration Tools
    - Schedule airport configuration change
    - Schedule closures
  - Tower Management Tools
  - Arrival/Departure Runway to Fix Mapping
    - Update / Change Fix mapping
  - Flight Lists
    - Proposed
    - Active
    - Historical
  - Coordination of Airport Changes with ATC and Operators

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TFDM EFD Tower Positions

Departure Strips Via FDIO (PDC/Non-PDC)

Notional

Queues Sortable by ACID/Time/Airline

Full Strip View

Hot Keys
- Strip Template Editing
- FRC display
- Runway Assignment
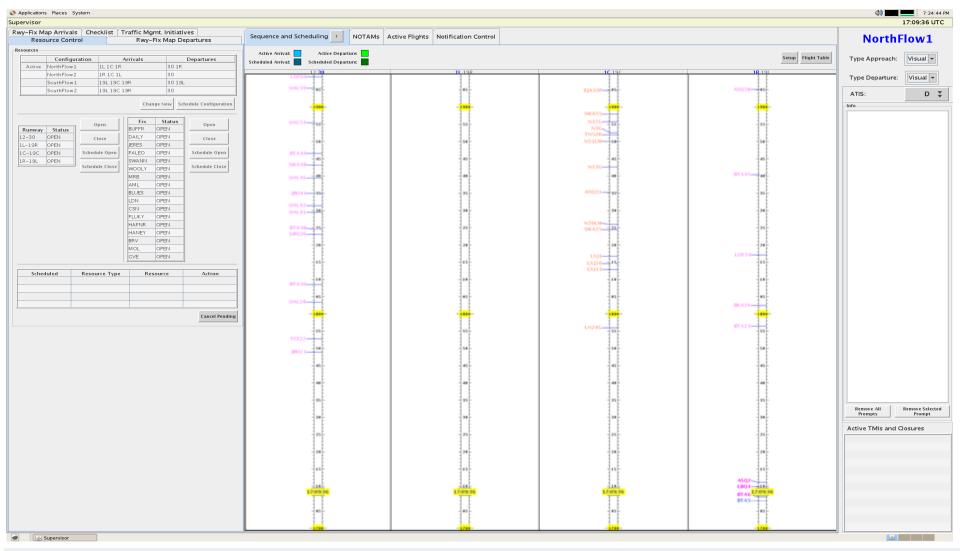- ATIS Indicator
- Strip Marking

Integration of Traffic Flow Management

- **Time Based Flow Management (TBFM)**
  - Will allow APREQs to be accomplished prior to push back and provide suggested pushback times to maximize fuel savings
  - Will provide improved departure schedules to the NAS enabling improved scheduling of TFM constraints and route programs

- **Traffic Flow Management System (TFMS)**
  - Will allow Traffic Management Initiatives (APREQs, EDCT, MIT/MINIT, GS, DS) to be integrated into TFDM schedules and electronic flight data

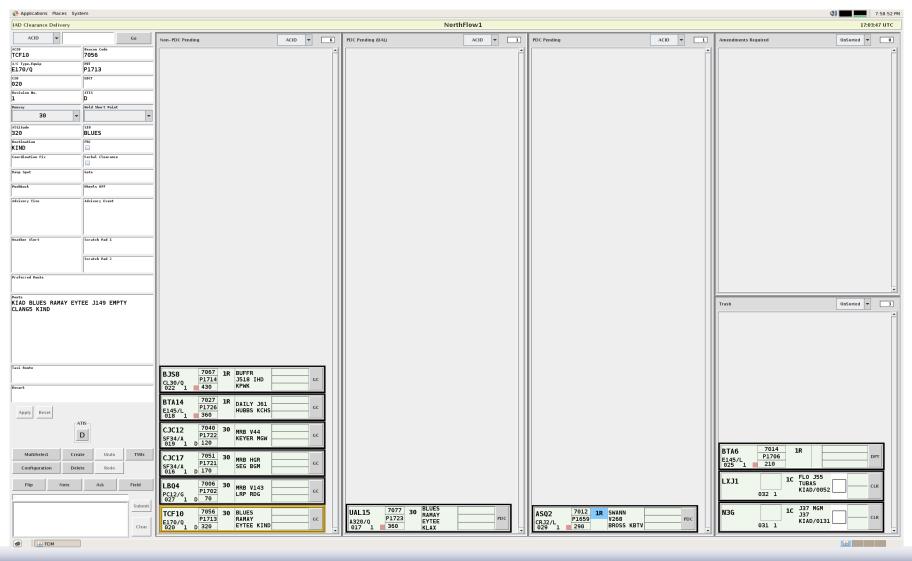- **Benefit: One complete plan to execute**

Supervisor/TMC Position Schedule

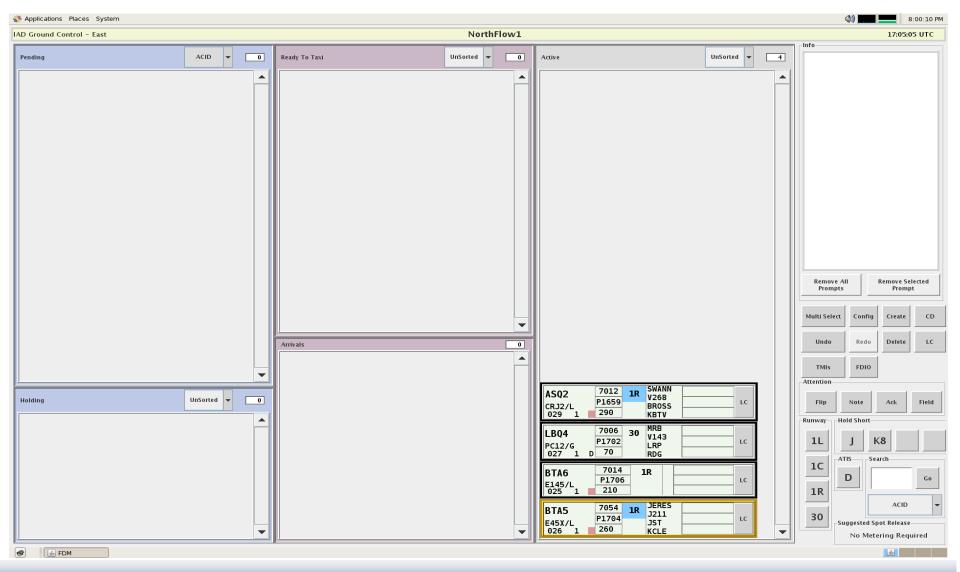**Federal Aviation Administration**

Backup Slides

Clearance Delivery

Ground Control Position

Local Control Position

Terminal Flight Data Manager

Integrated EFD and ASDE-X/ASSC Functions Overview

Presented by: Kimberly Brooks

Tower Operations Existing Shortfalls: Surface Surveillance

- **Lack of controller intent data in ASDE-X**

- **No integration between EFD and Surface Surveillance**

- **Missing assessment of predicted surface congestion and surface resources information**

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Lack of Controller Intent Data

- **Improving ASDE-X safety logic and alerting from controller intent and aircraft state data**
  - Line up and Wait information
  - Runway Entry Location
  - Clear for take-off information

Potential Integration between EFD and Surface Surveillance

- **Coordination of ASDE-X configuration data with TFDM EFD**
  - Airport Configuration
  - Closed Runway
- **Synchronization of ASDE-X track and flight data**
  - Safety alerts
  - Auto strip movement
  - Associate EFD with ASDE-X track
- **Predicted airport congestion / gridlock**
  - Current ASDE-X track data coupled with:
    - Predicted arrival demand
    - Gate status from flight operators

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Integrated Flight and Surveillance Data

Flight Data Display (FDD)

ASDE-X Data

Surface Congestion and Use of Surface Resources

- **Predicted Airport Congestion / Gridlock**
  - Current ASDE-X track data coupled with:
    - Predicted arrival demand
    - Gate status from flight operators

Thank You!

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TFDM Acquisition/ Implementation Overview

Presented by: Jim Benjamin

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FAA Investment Analysis Process

- ## Initial Investment Decision
  - Evaluate Alternatives, Develop Initial Business Case
  - Approve Initial Investment - Select Alternative
  - Release Request for Proposal (RFP)

- ## Final Investment Decision
  - Evaluate Proposal
  - Approve Final Investment – Establish Program Baseline
  - Award Contract

http://fast.faa.gov

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TFDM Scope Revision

- ## Background

  - Q2 CY2012 agreement with Surface Operations Office to incorporate surface 2015 initiatives into TFDM (Realize Surface Efficiency Improvements)

  - August 15, 2012 FAA approval of revised scope and new IID schedule

- ## Goals

  - Focus on operational needs within the TFDM "Flagship Items"

  - Focus on realizing early benefits from TFDM capabilities

  - Reduce program risk by addressing fewer sites as part of TFDM Core (Prove concept prior to a major FAA commitment of resources)

  - Enable other NAS system improvements through TBFM, TFMS, etc. integration

  - Maintain FY2017 Initial Operational Capability target for TFDM

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Scope Revision Summary

- **TFDM program**
  - Focuses on electronic flight data and surface metering including enhanced information exchange with the Flight Operators
  - Different TFDM capabilities implemented based on ATCT need
  - Defers major ATCT infrastructure consolidation

- **NAS-integrated TFDM (2017-2020) to limited number of metropolitan Areas**
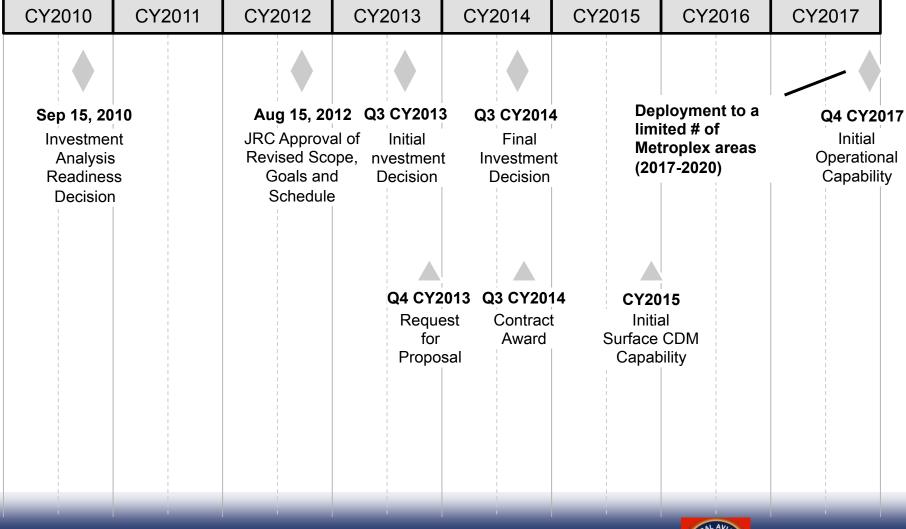 - TFDM System Configurations Assessed
  - Initial Surface CDM Capability (2015)
  - FAA Investment Process will dictate number and location of sites

- **Potential TFDM Future Work Packages**
  - Expand deployment
  - Enhance decision support capabilities
  - Incremental consolidation of ATCT automation within NextGen framework

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TFDM Notional Schedule

CY2010	CY2011	CY2012	CY2013	CY2014	CY2015	CY2016	CY2017

Sep 15, 2010
Investment Analysis Readiness Decision

Aug 15, 2012
JRC Approval of Revised Scope, Goals and Schedule

Q3 CY2013
Initial Investment Decision

Q3 CY2014
Final Investment Decision

Deployment to a limited # of Metroplex areas (2017-2020)

Q4 CY2017
Initial Operational Capability

Q4 CY2013
Request for Proposal

Q3 CY2014
Contract Award

CY2015
Initial Surface CDM Capability

TFDM Acquisition Goals

2015 Goal:

– Projected TFDM Award – October 2014

– 14 Months to achieve Initial IOC (Dec 2015)

- Limited Surface CDM

- Surface Situational Awareness at associated TRACONs/ ARTCCs

2017 Goal:

– 38 Months to achieve IOC for remaining TFDM capability (2017)

– Scalable – Possible Configurations:

- Full Functionality

- EFD with TFDM/TFM Integration

- EFD only

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TFDM Implementation Challenges

- **Surface CDM (Surface Metering)**
  - Managing a Fundamental change in Airport Surface Operations in the NAS
    - Continuing to allow Air Traffic Control to manage the airport safely and effectively
    - Collaborate with Flight Operators so that their investment in the Surface CDM process will lead to substantial benefits
  - No Airport Environment is the same
    - Metering tools, procedures and policies will need to be adaptable to many airport environments.

- **Electronic Flight Data**
  - Transiting Flight Data management from paper to electronic
    - Procuring a tool both flexible and effective enough to cover the multiple levels of ATC Tower environments in the NAS
    - Developing policies and standards for EFD which establishes a national standard while allowing adaptation to meet local needs

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TFDM Implementation Challenges (Con'd)

- **Deploying Metering and EFD services quickly and effectively into the NAS**
  - Taking advantage of existing capabilities in the market place
  - Taking advantage of existing NAS capabilities and infrastructure
  - Managing the transition and integration of multiple NAS platforms with TFDM
  - Managing ATCT space and environmental limitations
  - Allowing for efficient transition and integration of TFDM into future FAA air traffic management concepts, systems and architectures
  - Managing the development of the TFDM support infrastructure including: maintenance, training and logistics.

TFDM Acquisition

- **Limited surface metering and surface situation awareness capability in 2015**
  - COTS capability with limited NAS integration
  - Provides:
    - Potential of early benefits of queue management with flight operators interaction
    - Access to both AT and FO stakeholders which will support the joint development of implementation metering processes and procedures
    - Platform(s) which will support the integrated TFDM design, development and test processes
      - Transition of the 2015 Capability to the 2017 ISD product

Revised TFDM Project Schedule

- **Investment Analysis Milestone Schedule**
  - Initial Investment Decision for Core   Q3 CY2013
  - Final Investment Decision for Core   Q3 CY2014
  - Final Investment Decision for Work Packages   TBD

- **Acquisition Milestone Schedule**
  - Market Survey   Q4 CY2011
  - Market Survey Vendor Meetings and Visits   Q2 CY2012
  - Industry Day   Q4 CY2012
  - RFP   Q4 CY2013
  - Fly-Off   Q1 CY2014
  - Contract Award   Q3 CY2014

- **Implementation Milestone Schedule**
  - Contract Award   Q3 CY2014
  - Initial Surface CDM Capability   CY2015
  - First Site Initial Operating Capability (IOC) CY2017
  - Last Site IOC   TBD

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Industry Interaction – Next Steps

- **Future Market Survey**
  - Identify market capabilities based on revised scope

- **WE WELCOME - Industry information exchange covering potential TFDM acquisition and implementation strategies**

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Potential TFDM System Configurations

- **Looking for a scalable TFDM system based on the type of airports**
- **Configurations**
  - Full Functionality
    - EFD with ASDE integration
    - Surface CDM (Departure metering)
    - Decision Support capabilities (Airport configuration, departure routing, runway assignment, runway schedule generation, flight operators interface, taxiways and runways status)
    - Integration with TFM systems
  - EFD with TFDM/TFM Integration
    - EFD with ASDE integration
    - Decision support capabilities (Airport configuration, runway assignment, Flight operators interface)
    - Integration with TFM systems
  - EFD only
    - EFD
    - Limited decision support capabilities (Airport configuration, runway assignment)
    - Limited flight data exchange with TFM systems

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2015 TFDM Acquisition Issues/Risks

- **Goal:**
  - Projected TFDM Award – October 2014
  - 14 Months to achieve Initial IOC (Dec 2015)
    - Limited Surface CDM
    - Surface Situation Awareness at associated TRACONs/ARTCCs
- **Programmatic Issues/Risks:**
  - Implementation Schedule Issues/Risks - AGGRESSIVE Schedule
    - Develop support infrastructure, Initial Requirements Review, Site Surveys, Site Engineering, Installation, Adaptation, SOP development, Test
  - Effective Initial Surface Management System will depend on both the FAA and Airport Operators
    - Airport Operations will change.
    - Need to Develop/Implement Agreements with Flight Operators/Airlines
  - Need to Prepare FAA Staff for Use and Operation of the Systems
    - AT Training/Acceptance
    - Maintenance Training/Acceptance
    - Logistics

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2017 TFDM Acquisition Issues/Risks

- **Goal:**
  - Projected TFDM Award – October 2014
  - 38 Months to achieve IOC for remaining TFDM capability (2017)

- **Programmatic Issues/Risks:**
  - Transition of the System to the 2017 ISD product
    - Assess COTs product capabilities
    - Change to the CHI
  - Implementation Schedule Issues/Risks:
    - Develop support infrastructure, Initial Requirements Review, Site Surveys, Site Engineering, Installation, Adaptation, SOP development, Test

Thank You!

PMO – Industry Forum 2012 – TFDM

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